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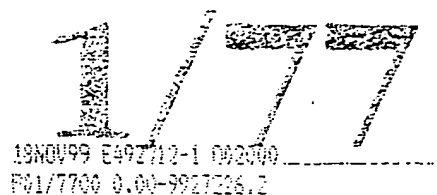
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1. Your reference

GWS\21909

2. Patent application number

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**9927226.2**

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Jarzon Plastics Limited  
Acorn House  
33 Churchfield Road  
London  
W3 6AY  
Great Britain

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

Nut and seat assembly for clamp

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

MATHYS & SQUIRE  
100 Grays Inn Road  
London WC1X 8AL

Patents ADP number (if you know it)

1081001

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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

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## Patents Form 1/77

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Continuation sheets of this form

Description 9

Claim(s) 5

Abstract —

Drawing(s) 10

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Priority documents

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Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

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11. I/We request the grant of a patent on the basis of this application.

Signature

Date

Mathy & Squire

17 November 1999

12. Name and daytime telephone number of person to contact in the United Kingdom

George W Schlich

0171 830 0000

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# NUT AND SEAT ASSEMBLY FOR CLAMP

5 The present invention relates to a nut and seat assembly for a clamp, to a clamp comprising that assembly and to methods of fastening articles such as pipe work using clamps.

10 A metal clamp is known for securely and hygienically attaching pipe work, typically for attachment of a flexible plastic outer hose onto a more rigid, inner metal pipe. Such clamps are in wide application, in particular in the food and hygiene industries, and as such these clamps need to comply with strict requirements for hygiene including integrity of clamping action and sealing between the pipes clamped.

15 The known clamp, made of metal, comprises clamping jaws, hinged together by pivotal members drilled to receive a pivot pin. This type of pivot is, however, rather expensive, especially in a mass-produced item such as the known clamp. Further, the clamp is made from a relatively large number of components, and it would be desirable to make a clamp with fewer components.

20 In use, the known clamp is opened and closed a number of times, and it is a further problem that it is easy for the bolt and/or the nut to become separated from other parts of the clamp. The clamp then has to be discarded because it is incomplete.

25 It would be desirable to be able to make this type of clamp in a plastics material, but the differing strengths of plastics versus metal mean that it is not possible to copy the metal clamp and simply make it out of plastic.

30 Lastly, the known metal clamp operates satisfactorily and there are no significant complaints about the clamp in use.

It is an object of the present invention to provide a clamp for sealing of pipe work, the clamp being made of plastics material. A further object of the present invention is to provide for improved operation of a clamp.

5 Accordingly, the present invention provides a nut and seat assembly for a clamp, comprising

(i) a nut to be tightened onto a bolt; and

(ii) a clamp member having a seat for the nut and an aperture defined by an opening between prongs so the bolt can be inserted laterally into the aperture and the nut can be tightened axially against the seat;

10 wherein tightening of the nut onto the seat prevents outward movement of the prongs away from the bolt.

Thus, in use the nut and seat cooperate as the nut is tightened to hold the prongs of the seat and prevent them from being pushed outwards.

Optionally, tightening of the nut onto the seat additionally pushes the prongs of the clamp member together and can tighten the prongs around the bolt, and this option has a further advantage in ensuring as tight as possible a union between the respective components, namely nut, bolt and clamp member.

In an embodiment of the invention, the action of the nut and seat is obtained by combination of a mating surface at or towards a lower edge of the nut which co-operates with a corresponding mating surface on the seat, The nut is wound onto the bolt, with the bolt positioned between prongs of the second clamp member, and then as the nut is tightened onto the bolt action of the surfaces on each other prevents outward movement of the prongs and/or pushes the prongs together and tightens them around the bolt.

30 In a specific embodiment of the invention, described in detail below, a concave recess is provided on the nut and this cooperates with a convex

portion or portions on the seat and dimensioned so that tightening of the nut prevents splaying of the prongs, and preferably urges the prongs together.

5 It is convenient for the seat of the second clamp member to comprise prongs which form a U-shaped aperture having an open side. In this way, a bolt can be inserted laterally into the open side of the aperture until it locates at the bottom of the U. The seat is formed from upper surfaces of the prongs. There is an advantage in this embodiment, in that the nut can be located on the end of the bolt when the clamp is open and it is not necessary for the  
10 nut to be removed from the bolt for the clamp to be closed, as the bolt can be moved laterally into the open side of the aperture and the nut then turned and axially tightened into the bolt, axial tightening of the nut drawing the second clamp member toward the first clamp member and exerting clamping action.

15 The nut may comprise wings for hand tightening in use and also a means for machine tightening the nut onto the bolt during manufacture of a clamp which incorporates the assembly, such as a hexagonal portion to engage with a driver on or associated with the manufacturing process. In a specific  
20 embodiment of the invention the components of the assembly are made of plastics material, and suitable plastics include polycarbonate, nylons, polyoxymethylene (POM) and polysulphone. Generally, the plastic should be chosen so as to confer suitable strength to the clamp, including operational strength under hoop stress, as this stress is present in use of the clamp  
25 around a pipe. The plastic preferably resist water ingress. Good tensile strength is also preferred and the plastic is generally an engineering polymer rather than a commodity plastic. It is preferably mouldable and typically glass filled to add rigidity and ensure thick sections of components do not sink during the moulding process and to maintain integrity of the  
30 components. A fill level of from 30 to 40 percent is particularly suitable.

A second aspect of the invention provides a method of securing a clamp

around a pipe, comprising:-

locating an upper clamp member over the pipe;

locating a lower clamp member under the pipe, respective first ends  
of the clamp members being connected, optionally via a pivot, and a bolt  
being attached to the second end of one of the clamp members; and

tightening a nut onto the bolt so the nut engages with a seat on the  
second end of the other clamp member so as to close the clamp;

wherein the seat comprises prongs forming an open-sided aperture for  
the bolt; and tightening the nut prevents outward movement of the prongs  
away from the bolt.

Preferably, tightening the nut onto the bolt causes movement of the prongs  
inwards and tightens the prongs around the bolt.

A third aspect of the invention lies in a clamp, for clamping pipework,  
comprising:-

a first clamp member;

a second clamp member;

a bolt; and

a nut

such that when the first clamp member is attached to the second  
clamp member and the bolt is attached to the first clamp member the nut  
can be tightened onto the bolt so as to clamp pipework between the first  
and second clamp members,

wherein the second clamp member comprises an aperture defined by  
prongs and into which the bolt can be moved laterally, and tightening of the  
nut onto the second clamp member prevents splaying of the prongs.

In an embodiment of the invention shown in an example below, tightening  
of the nut onto a seat of the prongs of the second clamp member exerts an  
inward force on the prongs, towards the bolt. This confers the additional  
advantage of further holding together the nut and seat components of the

clamp and ensuring integrity of clamping action in use.

5 A suitable second clamp member comprises an open-sided, U-shaped aperture defined by prongs and in use the bolt can be moved laterally in and out of the aperture and the nut is tightened axially onto the bolt. Further, the first and second clamp members can be pivotally connected at respective first ends.

10 The bolt is typically separate from the first clamp member and comprises a retention means and the first clamp member comprises an aperture through which the bolt passes such that when the bolt has been passed through the aperture removal of the bolt from the first clamp member is resisted by the retention means. Thus, there is the advantage that once assembled it is unlikely in use that the bolt become separated from the first clamp member.

15 An example of a retention means comprises a resilient, angled projection so the bolt can easily be inserted into the aperture but is more difficult to remove once inserted. An example of a bolt comprises a T-shaped end portion to engage against the first clamp member in use and to act as a pivot for pivotal movement of the bolt relative to the first clamp member. At the  
20 end that receives the nut the bolt can comprise a non-threaded portion to facilitate location of the nut onto the bolt.

25 In a specific embodiment of the invention described in more detail below, the first and second clamp members are separate but pivotally engaged to each other and wherein one of the first and second members comprises a resilient retention means and the other comprises a surface against which acts the retention means, and wherein it is easy to snap the first and second members into pivotal engagement but more difficult to disengage the first  
30 and second clamp members thereafter. Thus once assembled it is unlikely in use that the first and second clamp members are detached from each other. The clamp is also made of plastics material.



Another embodiment of the third aspect of the invention provides a pipe clamp comprising at least first and second parts having a pivotal connection to allow the parts to be opened for receiving a pipe, and a nut and bolt which can be tightened to secure the clamp on the pipe, one of said parts  
5 having a bifurcation at one end through which the bolt passes, said end having means which engage with the nut when it is tightened on the bolt so as to limit opening of the bifurcation.

Preferably, a concave recess cooperates with a convex portion or portions  
10 dimensioned so that tightening the bolt urges the bifurcation together. The concave recess is suitably provided on an inside surface of the nut and the convex portion or portions are suitably provided on the end of the part through which the bolt passes.

A further aspect of the invention lies in a clamp, having an upper member and a lower member to go around a pipe, a nut and a bolt, wherein the bolt is separate from the lower clamp member and comprises a retention means and the lower clamp member comprises an aperture through which the bolt  
15 passes such that when the bolt has been passed through the aperture removal of the bolt from the lower clamp member is resisted by the retention means, and wherein the first and second clamp members are separate but pivotally engageable to each other and wherein one of the first and second members comprises a resilient retention means and the other comprises a surface against which acts the retention means, and wherein it is easy to  
20 snap the first and second members into pivotal engagement but more difficult to disengage the first and second clamp members thereafter.

Optional and preferred features of the first to third aspects of the invention may also be incorporated into a clamp of the fourth aspect.  
30

There now follows a description of a specific embodiment of the present invention, accompanied by drawings in which:-

Fig.s 1a and 1b show schematic end views of a prior art clamp and a clamp of the invention;

5 Fig.s 2a - 2e show side, top, bottom, rear and front views of an upper clamp member of a further clamp of the invention;

Fig.s 3a - 3d show side, top, rear, and front views of a lower clamp member of the clamp of Fig. 2;

10 Fig.s 4a - 4d show front, side, bottom and top views of a bolt for a clamp of the invention;

Fig.s 5a - 5d show front, side, bottom and top views of a nut for a clamp of the invention; and

15 Fig.s 6 - 12 show further examples of clamps of the invention illustrating preferred features thereof.

A known pipe clamp is shown in figure 1a.

20 Referring to figures 1b and 2 to 5, a clamp according to a preferred embodiment of the invention is shown generally as 10 and comprises upper clamp member 11 and lower clamp member 12 pivotally connected by respective pivot portions 13 and 14 of the upper lower members of known construction. Bolt 15 passes through aperture 16 in the lower clamp member 12 and nut 17 is tightened onto bolt 15 to close the upper and lower clamp members around pipe work (not shown).

25 Referring specifically to bolt 15, the bolt comprises a threaded portion 18 to engage the nut and has an end portion 19 of reduced diameter, designed to ease location of a nut onto the bolt. The end portion 19 is square in cross section, with a circle defined by the apices of the square being of a diameter

30

that is the same as or slightly less than the diameter of the inside of the thread. In addition, this end portion facilitates ejection of the bolt from a mould during the manufacturing process.

5       The other end of the bolt includes shoulders 20 which engage with the lower clamp member and allow the bolt to pivot whilst engaged with the lower clamp member. A retention lug (not shown) optionally projects from the shaft 23 of the bolt such that once the bolt has been inserted through aperture 16 in the lower clamp member it is difficult to remove the bolt from  
10       the lower clamp member.

Referring to the detail of the end of the lower clamp member 12, the end portion 24 comprises aperture 16 to which the bolt is inserted. The aperture 16 is oblong and allows the bolt to pivot with shoulders 20 engaging bolt  
15       seats 25. It is also an option for the aperture to be substantially circular.

Referring to the detail of the end of the upper clamp member, end portion 26 comprises prongs 27 which define a substantially U-shaped aperture 28 which has an open side 29 and a closed side 30. The end portion 26 also  
20       comprises projections 31 which cooperate with the nut as is described below.

The nut 17 comprises wings 32 for hand-tightening, and hexagonal end 33 which is used for machine assembly of the nut onto the bolt. Lower portion  
25       35 of the nut comprises inner, angled surface 34. In use, as the nut is tightened onto the bolt, the bolt being located within aperture 28 of the upper clamp member, surfaces 34 engage with projections 31, and cooperate with corresponding surfaces 36 on those projections, such that  
30       further tightening of the nut exerts a force inwardly, to prevent outward splaying of prongs 27 and to tighten prongs 27 around the bolt 15. Further projections 37 extend from the prongs 27 and prevent overclosing of the clamp.

Referring to figures 6 to 12, these figures show a number of views of further clamps embodying the invention described herein, assist in the understanding of the operation of the clamps and illustrate further optional features of preferred embodiments of the invention.

5

The invention thus provide a nut and seat assembly for a clamp, a clamp and a method of clamping articles such as pipes.

CLAIMS

1. A nut and seat assembly for a clamp, comprising
  - (i) a nut to be tightened onto a bolt; and
  - 5 (ii) a clamp member having a seat for the nut and an aperture defined by prongs so the bolt can be inserted laterally into the aperture and the nut can be tightened axially against the seat;  
wherein tightening of the nut onto the seat prevents outward movement of the prongs away from the bolt.
- 10 2. An assembly according to Claim 1, wherein tightening of the nut onto the seat pushes the prongs of the clamp member together and can tighten the prongs around the bolt.
- 15 3. An assembly according to Claim 1 or 2, wherein the nut comprises a mating surface at or towards a lower edge of the nut which co-operates with a corresponding mating surface on the seat so that as the nut is tightened onto the bolt action of the surfaces on each other prevents outward movement of the prongs and/or pushes the prongs together and tightens
- 20 them around the bolt.
- 25 4. An assembly according to any of Claims 1 to 3, wherein prongs of the clamp member form a U-shaped aperture such that in use a bolt can be inserted laterally into the open end of the aperture and the seat is formed from the sides of the prongs.
- 30 5. An assembly according to any of Claims 1 to 4, wherein the nut comprises wings for hand tightening in use and a means for machine tightening the nut onto the bolt during manufacture of a clamp which comprises the assembly..

6. An assembly according to any previous Claim made of plastics material.

5 7. A method of securing a clamp around a pipe, comprising:-  
locating an upper clamp member over the pipe;  
locating a lower clamp member under the pipe, respective first ends  
of the clamp members being connected, optionally via a pivot, and a bolt  
being attached to the second end of one of the clamp members; and  
tightening a nut onto the bolt so the nut engages with a seat on the  
10 second end of the other clamp member so as to close the clamp;  
wherein the seat comprises prongs forming an open-sided aperture for  
the bolt; and tightening the nut prevents outward movement of the prongs  
away from the bolt.

15 8. A method according to Claim 7, comprising tightening the nut onto  
the bolt so as to move the prongs inwards and tighten the prongs around the  
bolt.

20 9. A clamp, for clamping pipework, comprising:-  
a first clamp member;  
a second clamp member;  
a bolt; and  
a nut  
such that when the first clamp member is attached to the second  
25 clamp member and the bolt is attached to the first clamp member the nut  
can be tightened onto the bolt so as to clamp pipework between the first  
and second clamp members,  
wherein the second clamp member comprises an aperture defined by  
prongs and into which the bolt can be moved laterally, and tightening of the  
30 nut onto the second clamp member prevents splaying of the prongs.

10. A clamp according to Claim 9, wherein tightening of the nut onto the second clamp member exerts an inward force on the prongs, towards the bolt.
- 5 11. A clamp according to Claim 9, wherein the second clamp member comprises an open-sided, U-shaped aperture defined by prongs and in use the bolt can be moved laterally in and out of the aperture and the nut is tightened axially onto the bolt.
- 10 12. A Clamp according to any of Claims 9 to 11, wherein the first and second clamp members are pivotally connected at respective first ends.
- 15 13. A Clamp according to any of Claims 9 to 12, wherein the bolt is separate from the first clamp member and comprises a retention means and the first clamp member comprises an aperture through which the bolt passes such that when the bolt has been passed through the aperture removal of the bolt from the first clamp member is resisted by the retention means.
- 20 14. A clamp according to Claim 13, wherein the retention means comprises a resilient, angled projection so the bolt can easily be inserted into the aperture but is more difficult to remove once inserted.
- 25 15. A clamp according to any of Claims 9 to 14, wherein the bolt comprises a T-shaped end portion to engage against the first clamp member in use and to act as a pivot for pivotal movement of the bolt relative to the first clamp member.
- 30 16. A clamp according to any of Claims 9 to 15, wherein at the end that receives the nut the bolt comprises a non-threaded portion to facilitate location of the nut onto the bolt.
17. A pipe clamp comprising at least first and second parts having a pivotal

connection to allow the parts to be opened for receiving a pipe, and a nut and bolt which can be tightened to secure the clamp on the pipe, one of said parts having a bifurcation at one end through which the bolt passes, said end having means which engage with the nut when it is tightened on the bolt so as to limit opening of the bifurcation.

18. A clamp according to Claim 17, wherein a concave recess cooperates with a convex portion or portions dimensioned so that tightening the bolt urges the bifurcation together.

19. A clamp according to Claim 18, wherein the concave recess is provided on an inside surface of the nut and the convex portion or portions is or are provided on the end of the part through which the bolt passes.

20. A clamp according to any of Claims 9 to 19, comprising first and second clamp members which are separate but pivotally engaged to each other and wherein one of the first and second members comprises a resilient retention means and the other comprises a surface against which acts the retention means, and wherein it is easy to snap the first and second members into pivotal engagement but more difficult to disengage the first and second clamp members thereafter.

21. A clamp according to any of Claims 9 to 20 made of plastics material.

22. A clamp, having an upper member and a lower member, to go around a pipe, a nut and a bolt,

wherein the bolt is separate from the lower clamp member and comprises a retention means and the lower clamp member comprises an aperture through which the bolt passes such that when the bolt has been passed through the aperture removal of the bolt from the lower clamp member is resisted by the retention means, and

wherein the first and second clamp members are separate but



pivotally engaged to each other and wherein one of the first and second members comprises a resilient retention means and the other comprises a surface against which acts the retention means, and wherein it is easy to snap the first and second members into pivotal engagement but more  
5 difficult to disengage the first and second clamp members thereafter.

23. A clamp substantially as hereinbefore described and claimed.

24. A clamp substantially as hereinbefore described with reference to  
10 figures 1b and 2a-5d of the drawings.

25. A clamp substantially as hereinbefore described with reference to figures 6 to 12 of the drawings.

Prior  
Art

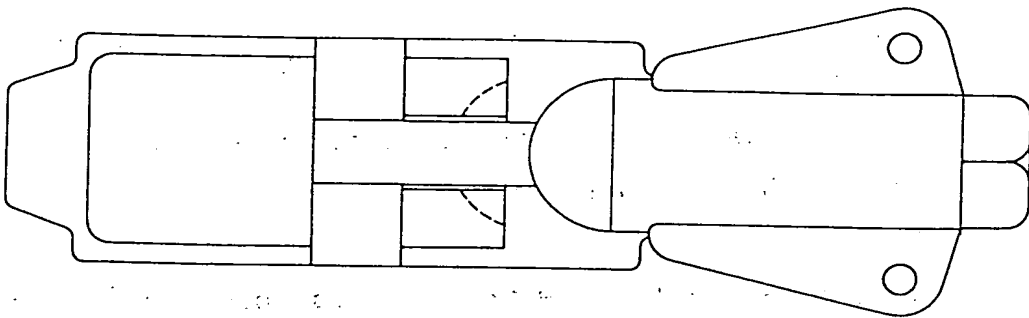


Fig. 1a

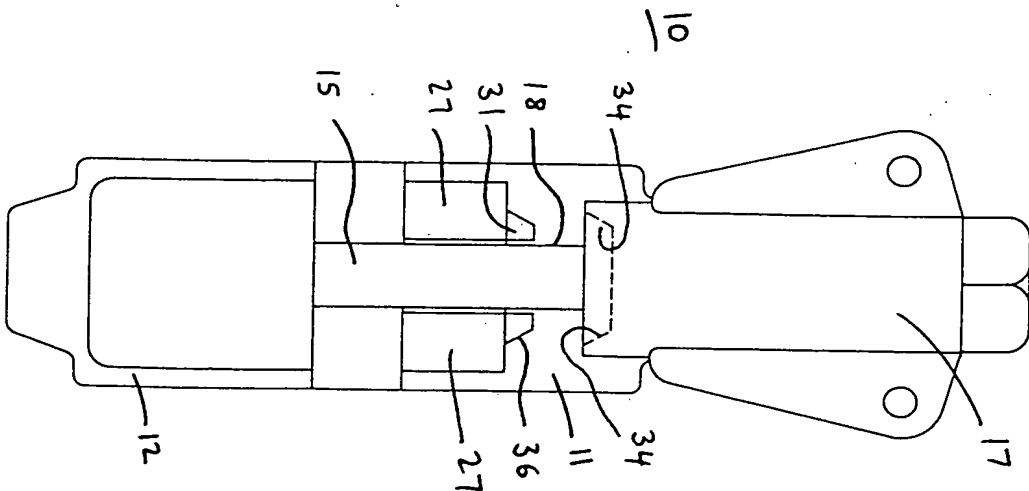


Fig. 1b

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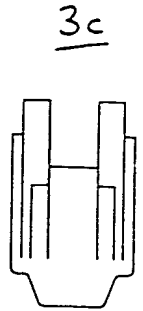
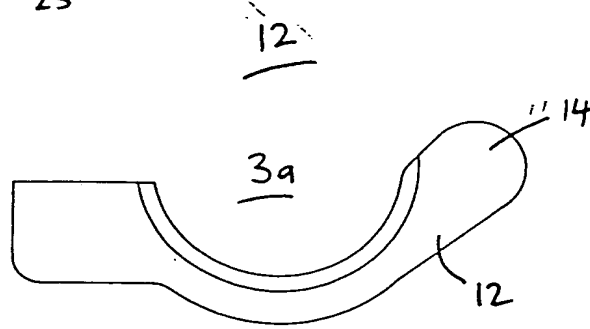
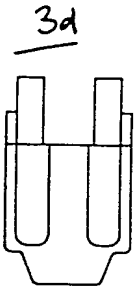
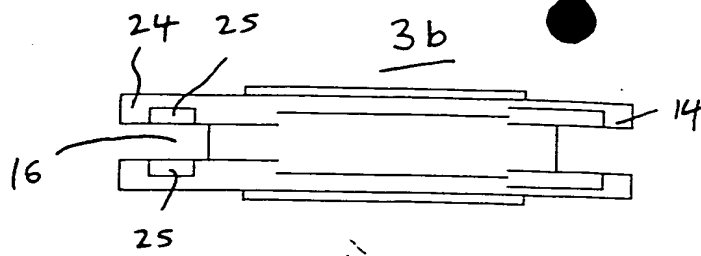


Fig. 3

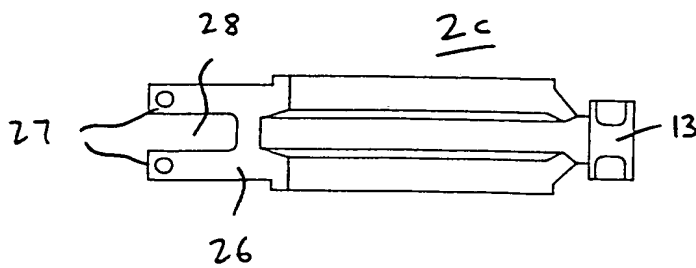
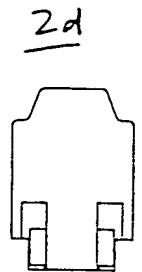
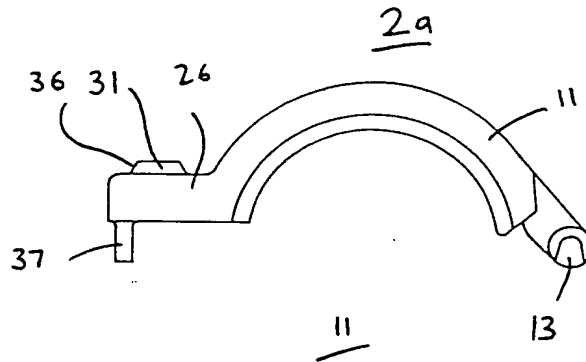
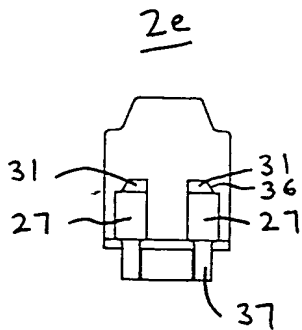
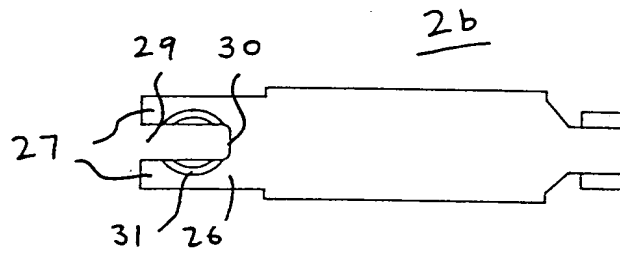


Fig. 2

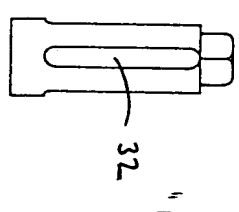
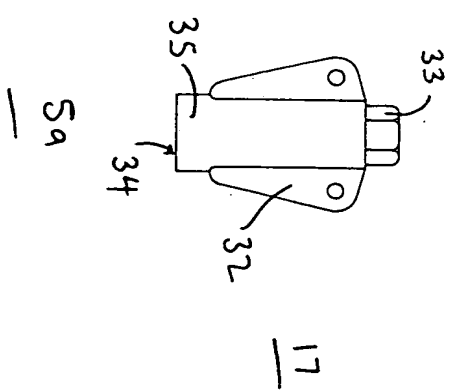
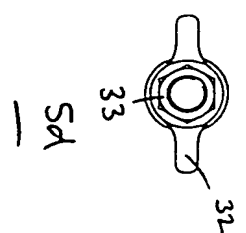
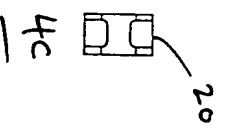
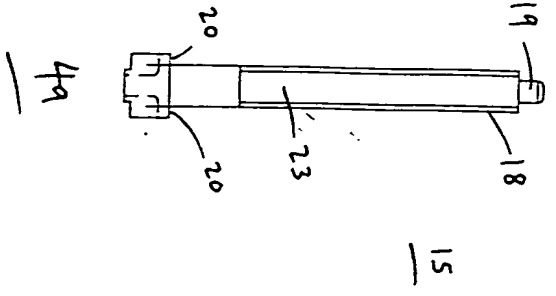
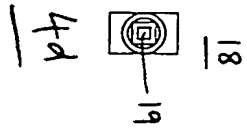


Fig. 4

Fig. 5

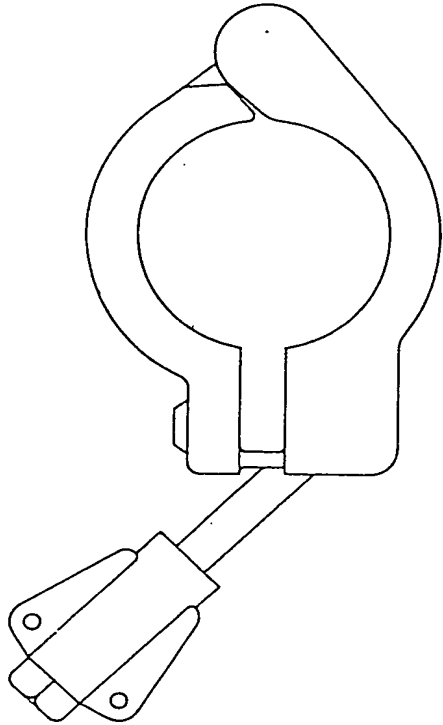
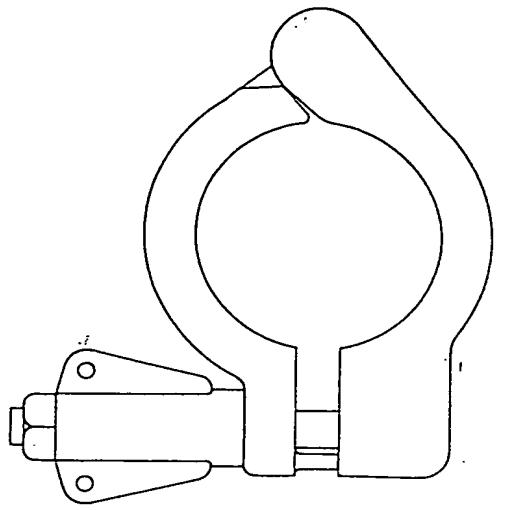
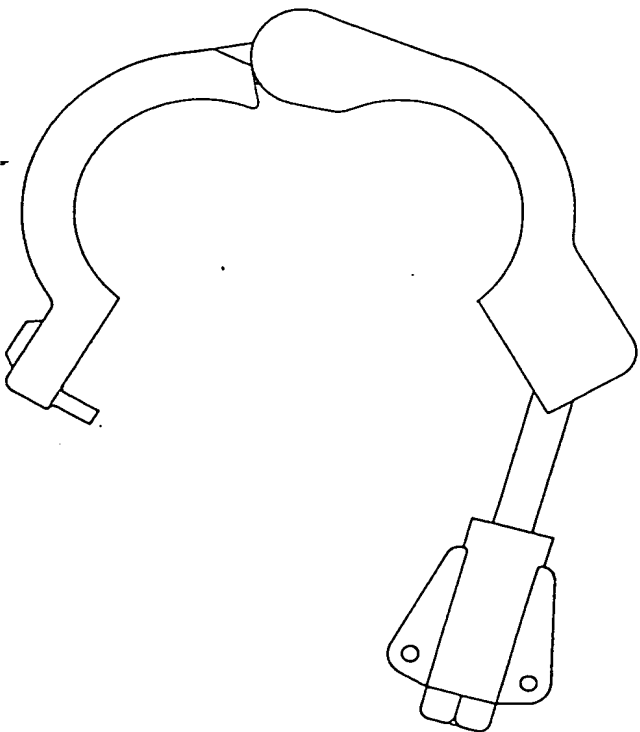
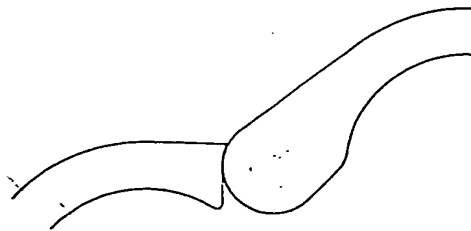


Fig. 6



D



11

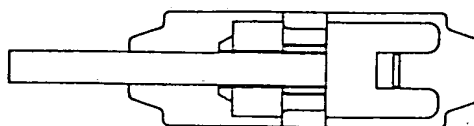
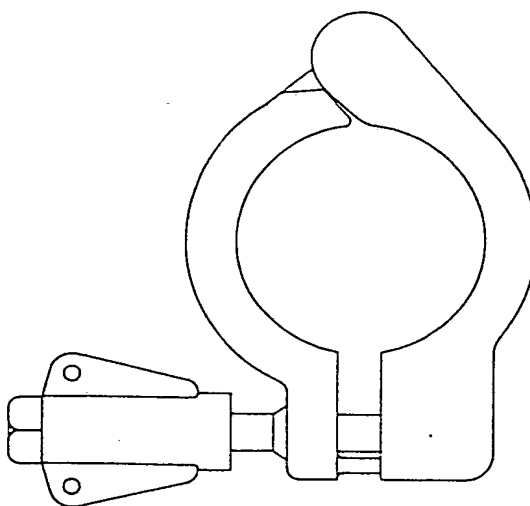
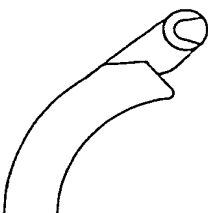
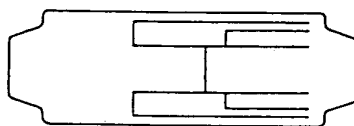
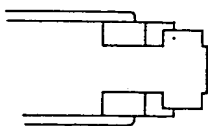
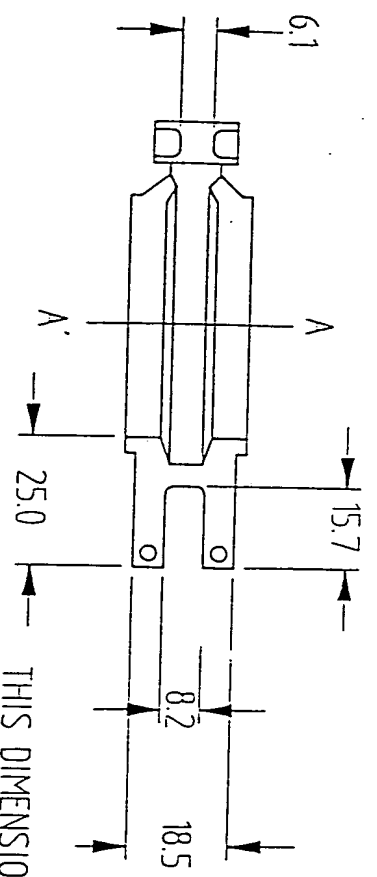
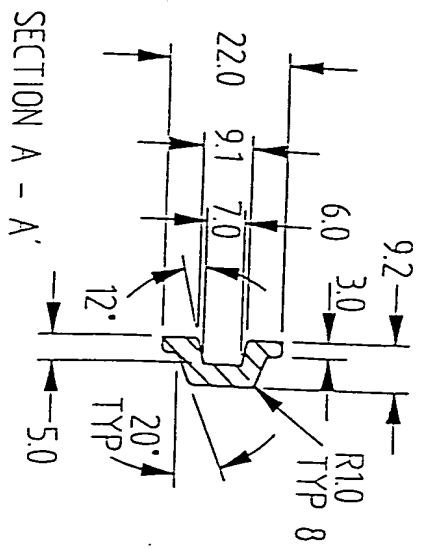
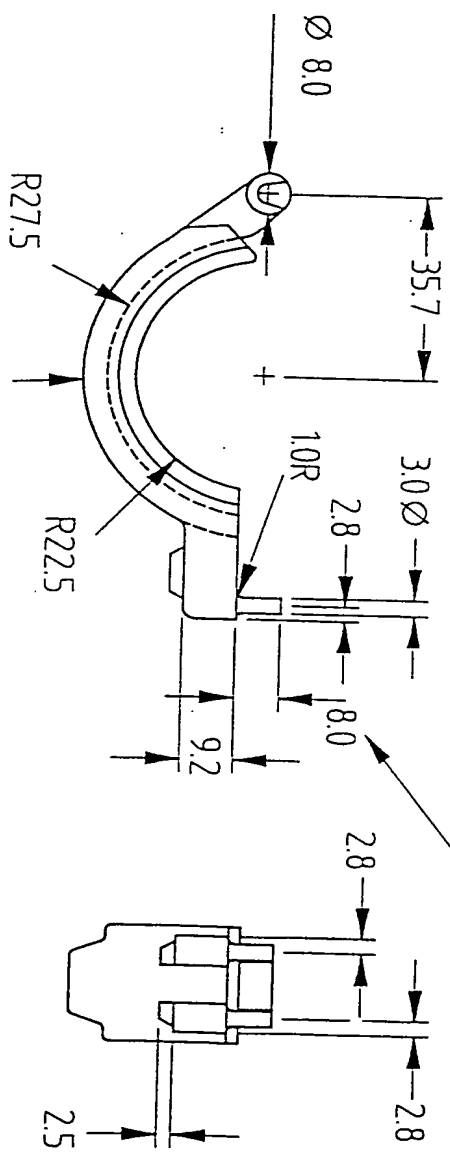
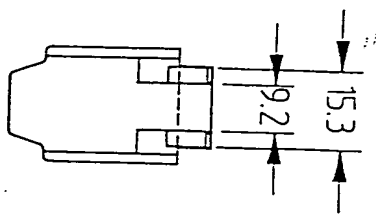


Fig 7.



THIS DIMENSION TO BE ADJUSTED  
BY TOOL PIN CHANGE.



Issue 3 9/11/99 Stop lugs & nut lug  
Issue 2: 8.2 was 7.2

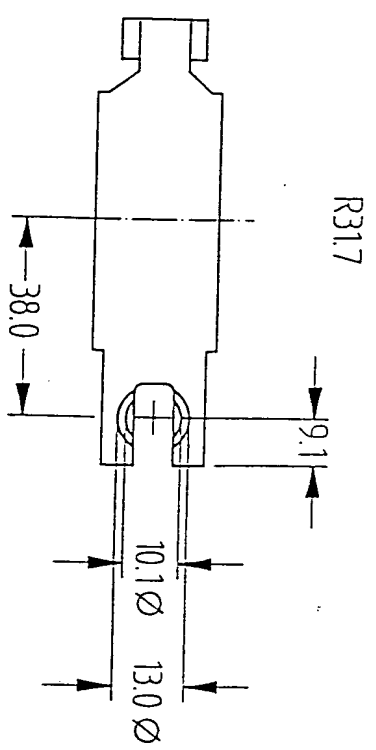


Fig. 8

TOLERANCES:-		NON DECIMAL DIMENSIONS, ± 0.50		ONE DECIMAL PLACE, ± 0.25		TWO DECIMAL PLACES, ± 0.10		ANGLES, ± 0.5°	
DIMS	UNITS	:-	MM	MATERIAL:-	40% GF PC WHITE	LEXAN 3414	FINISH:-	FINE SPARK	
© Jarzon Plastics Limited 1999		TITLE:-		CLAMP - LOWER CUP					
		DATE:-		22.3.99		A3			

PIVOT & BOLT AREAS, CLEAR OF  
8.0 Ø ASSEMBLED PIVOTS.  
BARS ADDED AFTER 1st MOULD TRIAL.

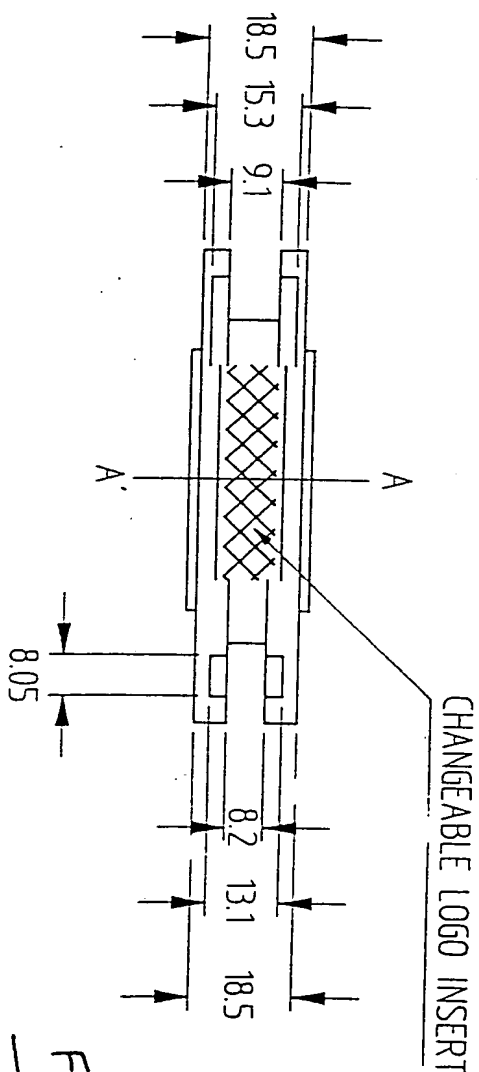
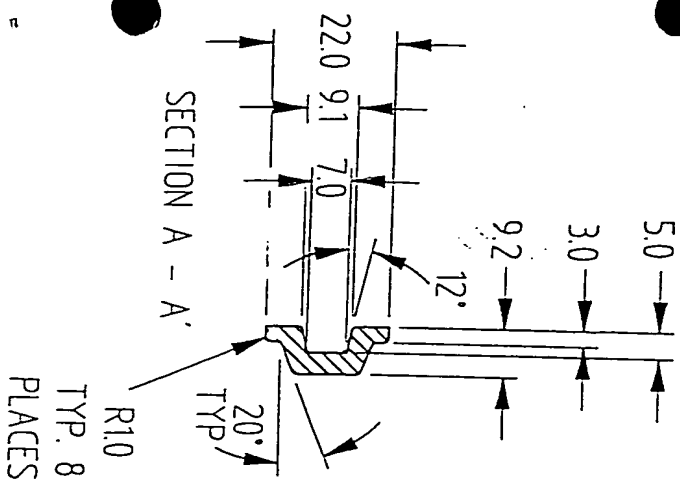
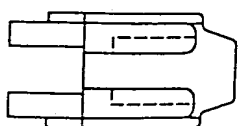
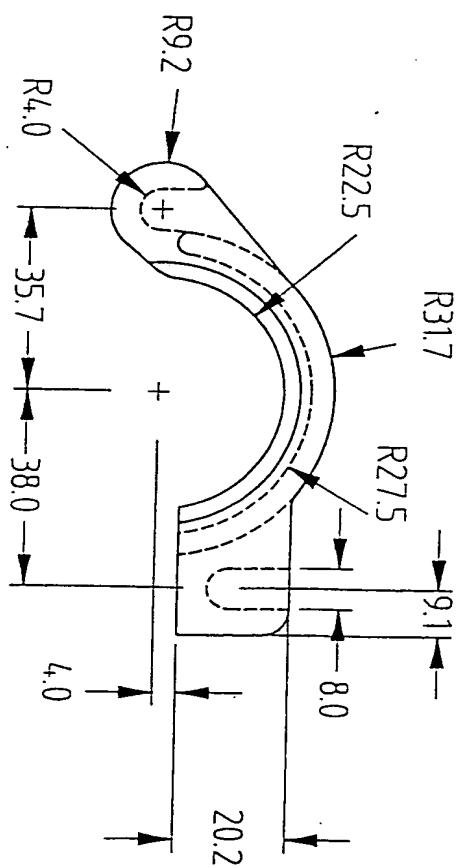
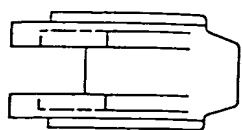


Fig. 9

Issue 3 8/11/99, Logo plate & clamp form  
Issue 2 9.4.99 Delete dim. 9.2

TOLERANCES:-

DIMET NS - MM

NON DECIMAL DIMENSIONS,  $\pm 0.50$

ONE DECIMAL PLACE,  $\pm 0.25$

TWO DECIMAL PLACES,  $\pm 0.10$

ANGLES,  $\pm 0.5^\circ$

MATERIAL:- 40% GF PC WHITE

LEXAN 3414

FINISH:- FINE SPARK

"

SCALE:- F.S.

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TITLE:-

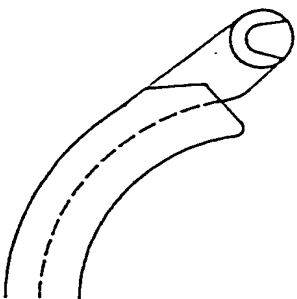
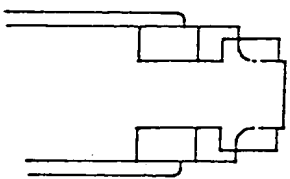
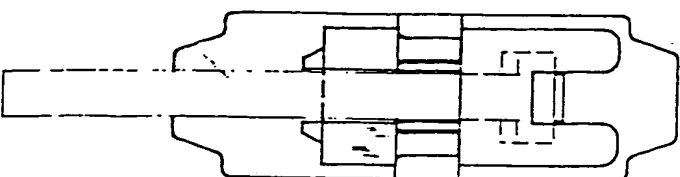
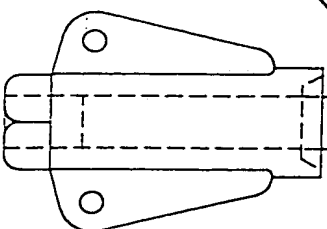
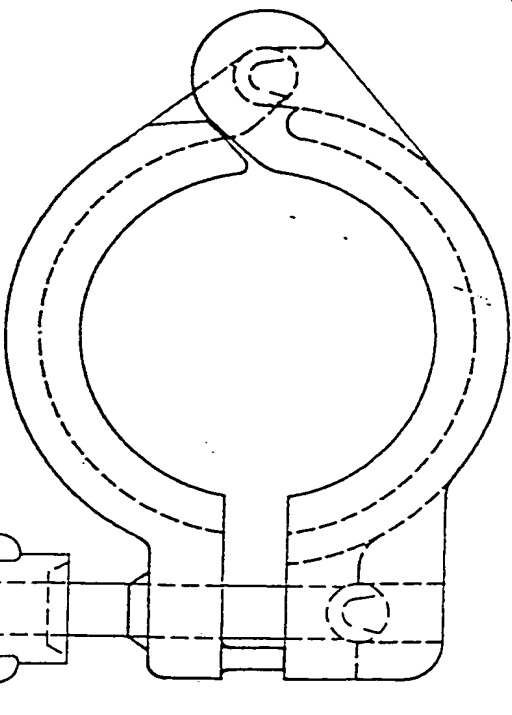
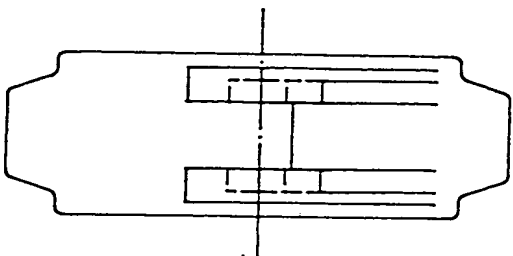
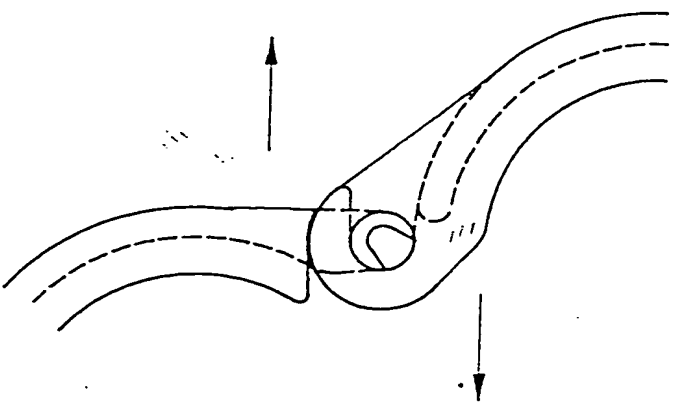
CLAMP - UPPER CUP

DATE:- 22.3.99

A3



TOLERANCES :-	NON DECIMAL DIMENSIONS, $\pm 0.50$ .	ONE DECIMAL PLACE, $\pm 0.25$ .	TWO DECIMAL PLACES, $\pm 0.10$ .	ANGLES, $\pm 0.50^\circ$ .
DIMENSIONS:- MM.	PROJECTION:- 3rd ANGLE.	MATERIAL:- POLYMER - T.B.A.	FINISH:- POLISHED - AS MOULDED	SCALE:- F.S.



C7 = 50.5  
Ref: Nominal size, 25  
Plastic C5 = 21.8  
ISO 2852:1993(E)

Fig. 10

Issue 2 9/11/99 General update

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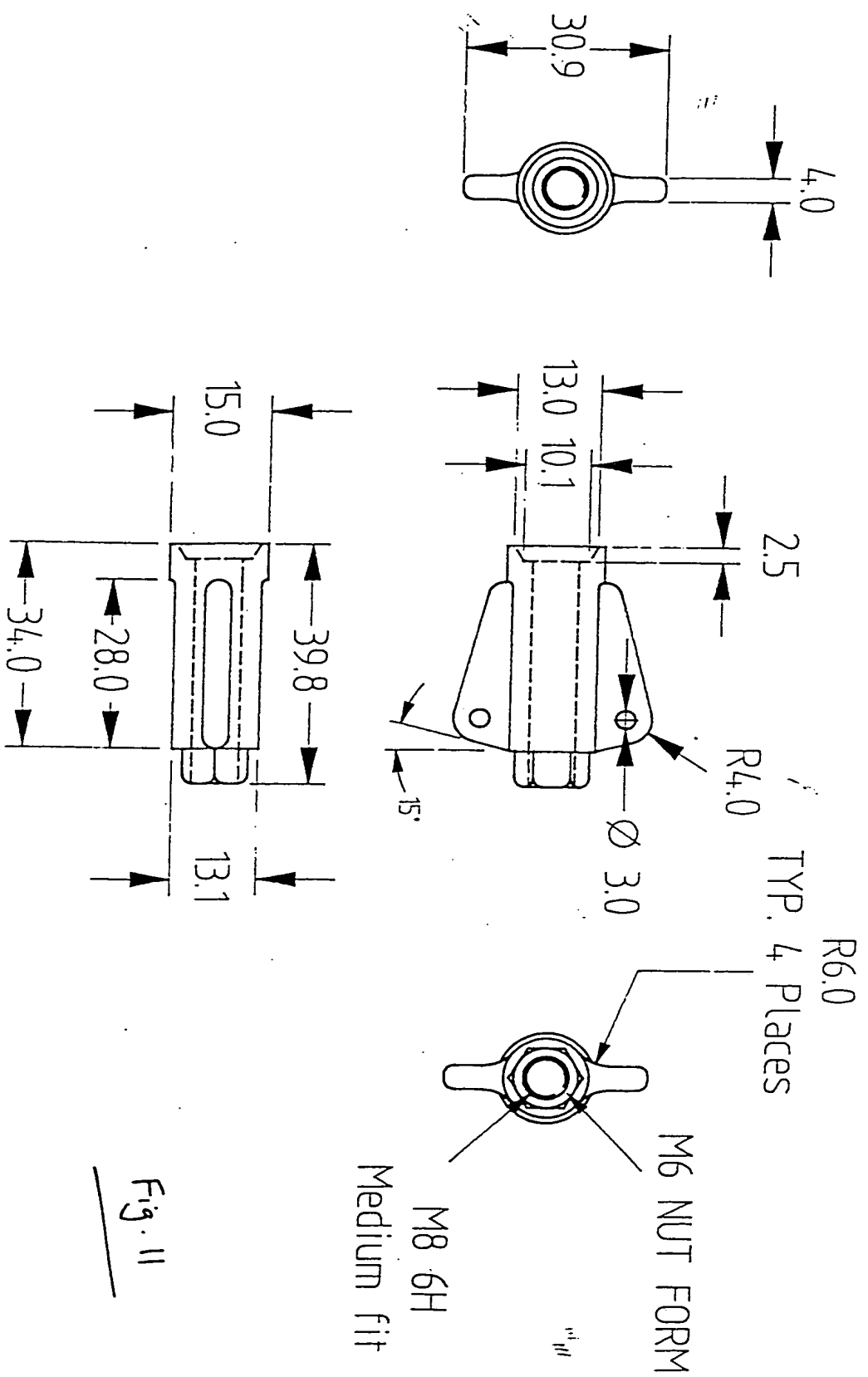
TITLE:- PIPE CLAMP - G.A.

DATE:- 22.3.99

A4

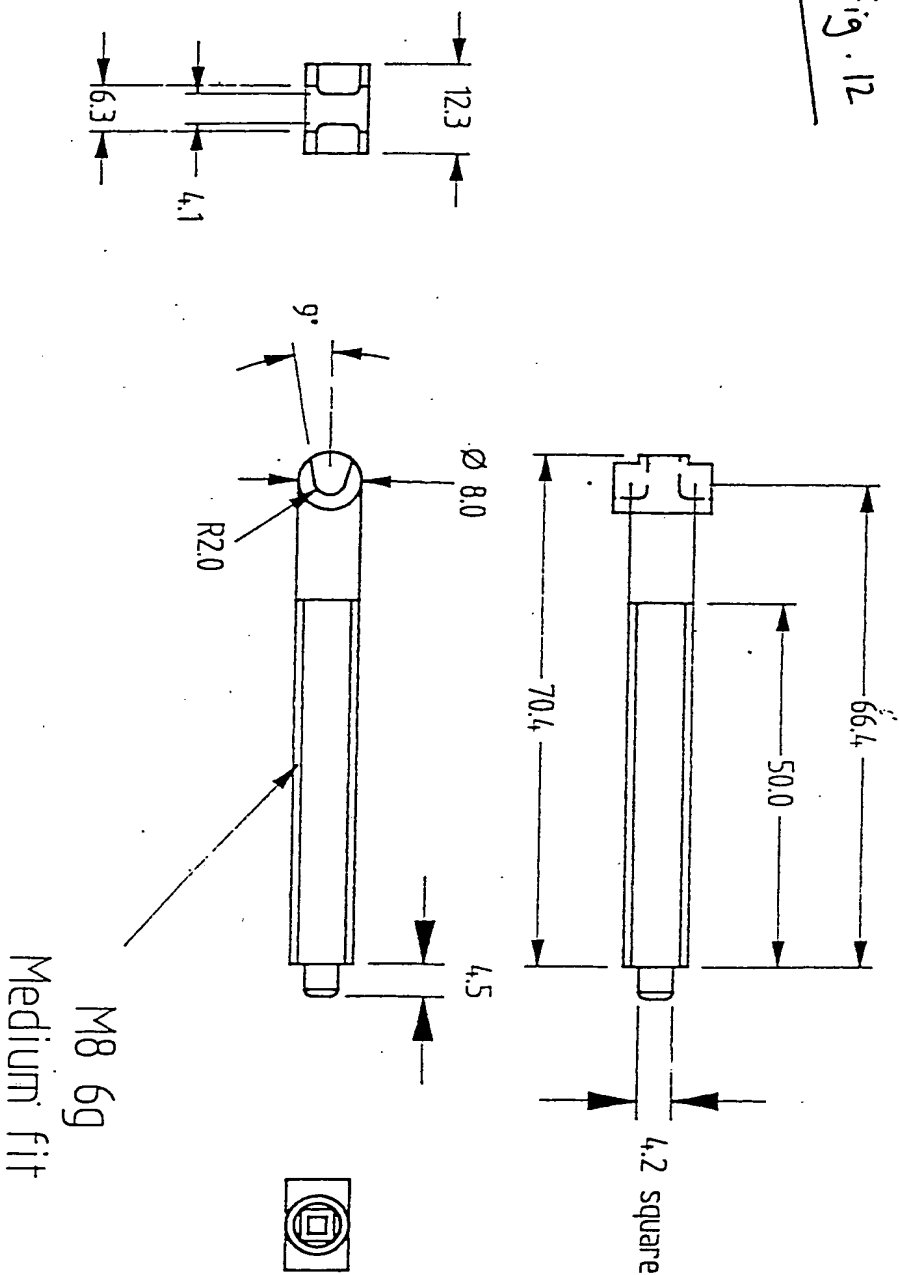
TOLERANCES :-		NON DECIMAL DIMENSIONS, $\pm 0.50$ .	ONE DECIMAL PLACE, $\pm 0.25$ .	TWO DECIMAL PLACES, $\pm 0.10$ .	ANGLES, $\pm 0.50^\circ$ .
DIMENSIONS:-	MM	PROJECTION:-	3rd ANGLE.	MATERIAL:-	PA 6.6 WHITE
				ZYTEL	ST 801
				FINISH:-	FINE SPARK
				SCALE:-	FS

Iss. 2 8/11/99 Style,end boss detail & radii.



TOLERANCES :-	NON DECIMAL DIMENSIONS, $\pm 0.50$ .	ONE DECIMAL PLACE, $\pm 0.25$ .	TWO DECIMAL PLACES, $\pm 0.10$ .	ANGLES, $\pm 0.50^\circ$ .
DIMENSIONS:- MM	PROJECTION:- 3rd ANGLE.	MATERIAL:- PA 6.6 WHITE ZYTEL ST 801	FINISH:- FINE SPARK	SCALE:- FS

Fig. 12



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1999 TITLE:-

CLAMP BOLT

DATE:- 22.3.99

A4

Issue 2 8/11/99. End square added.